Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

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Vol. 16. April, 1914. No. 184.

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Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price ***$1.50*** per year (domestic and foreign); single copies 15 cents. Prices of Volumes 1 and 2 (1899 and 1900) on application. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

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Subscriptions, advertisements, and business communications to
W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from
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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 16. April, 1914. No. 184.

SOME ANNUAL HALOPHYTIC ASTERS OF THE MARITIME PROVINCES.

M. L. Fernald.

(Plate 109.)

When the genus *Aster* was worked over for the seventh edition of Gray's Manual the three annual species included were noted as occurring on the marshes or saline sands of the lower River or the Gulf of St. Lawrence, two of the records based upon collections by the present writer, and one upon a specimen from Professor John Macoun. The three species, as then treated, were *A. subulatus* Michx., the continuous northeastward range of which stops at the New Hampshire coast, but which is represented by a plant discovered in 1902 by Mr. Emile F. Williams and the writer on the saline shores of Nepisiguit Bay, an arm of the Baie des Chaleurs in northeastern New Brunswick; *A. angustus* (Lindl.) T. & G., a plant of the Great Plains of western North America and of salt plains of Siberia and Afghanistan, which has an isolated station on the shores of the St. Lawrence at Cacouna, Temiscouata Co., Quebec; and *A. frondosus* (Nutt.) T. & G. of alkaline spots among the Rocky Mountains, with which was identified a specimen collected in 1888 by Professor John Macoun at Brackley Point, Prince Edward Island, and sent to the Gray Herbarium as *A. subulatus*.

During the summer of 1912, while botanizing about the Gulf of St. Lawrence, Messrs. Bayard Long, Harold St. John and the writer made a special point of collecting adequate material of the Prince Edward Island plant. It was found to be somewhat general in brackish sands

of the "North Shore," i. e. the outer or Gulf shore of the island, at least from Tignish to Grand Tracadie, while a seemingly identical plant was found on brackish shores at Étang du Nord, at the southern end of Grindstone Island in the Magdalen Island group; and a closely related but obviously distinct plant was found in great profusion covering the damp brackish sands at Grande Entrée near the northern end of the Magdalen Islands.

Upon critically studying this material it was quickly apparent that the Prince Edward Island plant, which had been originally distributed as *Aster subulatus* and subsequently referred to *A. frondosus*, could have no specific connection with either, for it has quite rayless heads like those of the unique *A. angustus*, and in its very foliaceous involucre it is unlike any described species. It was also apparent that the little plant so abundant at the northern end of the Magdalen Islands differed in some pronounced varietal characteristics from the plant of Grindstone Island and of Prince Edward Island.

In the course of this study of the annual Asters from Prince Edward Island and the Magdalen Islands, the plant from northeastern New Brunswick, which had been referred to *A. subulatus*, was also reexamined and found to differ in certain important points from the plant of our Atlantic coast. It was consequently gratifying that, in his explorations of the coastal sands of eastern New Brunswick during the late summer and autumn of 1913, Mr. Sidney F. Blake was able to secure a collection of mature material of the so-called *A. subulatus* from the shores of Nepisiguit Bay and thus to reinforce the characters already noted in the rather immature material of Williams & Fernald. And it was especially interesting that, upon the marshes of the Tracadie Lagoon of northeastern New Brunswick, Mr. Blake should also find a third area of the little rayless species already known from the islands in the Gulf; but the most notable point about the plant of the Tracadie Lagoon is that, while clearly belonging specifically with the others, it should show in its foliage and involucres characters almost exactly intermediate between the plant of the Prince Edward Island sands and the extreme variety which covers the sands of Grande Entrée, near the northern end of the Magdalen Islands.

The third species of this remarkable group of annual Asters of the St. Lawrence shores, the plant identified with *Aster angustus*, has not, so far as the writer is aware, been collected since he and Professor J. F. Collins found over-ripe material at the border of a salt marsh at Ca-

couna in 1904. But of the peculiar plants from the Gulf of St. Lawrence we now have an abundance of material; and it is clear that the rayless one is distinct from the species with which the earlier and inadequate collection was placed and that the other, from Nepisiguit Bay, is a pronounced variety of the southern *A. subulatus*.

The rayless plant may be called

Aster (Conyzopsis) **laurentianus**, n. sp., planta annua ubique carnosa 3–25 cm. alta, caule subsimplici vel cum ramis brevibus axillaribus racemosis 1-capitatis instructo vel interdum ramis elongatis; foliis lineari-spathulatis vel -lanceolatis obtusis vel acutiusculis mucronatis integris 2–6 cm. longis 2–7 mm. latis; involucro hemispherico-campanulato, bracteis 2–3-seriatis plerumque foliaceis carnosis lanceolatis lineari-spathulatis vel lineari-oblongis acuminatis mucronatis plerumque subaequalibus 5–8 mm. longis, exterioribus 3–5 valde elongatis 8–18 mm. longis 1–2 mm. latis; corollis exterioribus numerosis filiformibus eligulatis stylo brevioribus, corollis centralibus paucis filiformibus limbo campanulato 4–5-fido flavescentibus stigmata purpurascentia subaequantibus; achaeniis pilosis.

Annual, glabrous throughout, fleshy, 3–25 cm. high; the stem subsimple or with short axillary racemose 1-headed branches or occasionally with elongate branches: leaves linear-spatulate or -lanceolate, obtuse or acutish, mucronate, entire, 2–6 cm. long, 2–7 mm. wide: involucre hemispherical-campanulate: the bracts in 2–3 series, mostly foliaceous and fleshy, lanceolate, linear-spatulate or linear-oblong, acuminate, mucronate, mostly subequal, 5–8 mm. long; the exterior 3–5 very elongate, 8–18 mm. long, 1–2 mm. wide: the outer corollas numerous, filiform, without rays, shorter than the style; central corollas few, filiform, with a 4–5-toothed campanulate limb, yellowish, about equaling the purplish stigmas: achenes pilose.— Prince Edward Island: damp sand back of the strand, Tignish, August 6, 1912 (barely in anthesis), *Fernald, Long & St. John*, no. 8163; salt marshes, Brackley Point, September 5, 1888, *J. Macoun* (distributed as *A. subulatus*); damp brackish sands, Brackley Point, August 31, 1912, *Fernald, Long & St. John*, no. 8166 (type in Gray Herb.); wet brackish sand, Grand Tracadie, August 31, 1912, *Fernald, Long & St. John*, no. 8167. Magdalen Islands: wet brackish sand or mud at the margin of a pond southwest of Étang du Nord village, Grindstone Island, August 15, 1912, *Fernald, Long & St. John*, no. 8164. Figs. 1–3.

Var. **magdalenensis**, n. var., humilis 3–5 cm. altus valde carnosus; foliis spathulatis apice rotundatis vel obtusis; bracteis exterioribus 5–11 haud elongatis spathulatis vel oblongis vel anguste ellipticis plerumque obtusis 8–10 mm. longis 2–4 mm. latis.

Low, 3–5 cm. high, very fleshy: leaves spatulate, rounded or obtuse at apex: outer bracts 5–11, not at all elongated, spatulate, oblong or

narrowly elliptic, mostly obtuse, 8–10 mm. long, 2–4 mm. wide.— Magdalen Islands: damp brackish sandy beach, Grande Entrée, Coffin Island, August 19, 1912, *Fernald, Long & St. John,* no. 8165 (type in Gray Herb.). Fig. 4.

Var. **contiguus**, n. var., humilis 2–13 cm. altus; foliis spathulatis apice rotundatis vel obtusis: bracteis exterioribus 5–11 lineari-oblongis haud vel rare elongatis acutis vel acutiusculis 5–10 mm. longis 1–2 mm. latis.

Low, 2–13 cm. high: leaves spatulate, rounded or obtuse at apex: outer bracts 8–11, linear-oblong, not at all or rarely elongated, acute or acutish, 5–10 mm. long, 1–2 mm. wide.— New Brunswick: drier spots in marsh, Tracadie, Gloucester Co., September 10, 1913, *S. F. Blake,* no. 5645 (type in Gray Herb.). Fig. 5.

In its rayless marginal flowers (fig. 2) *Aster laurentianus* is nearest related to *A. angustus,* which has the linear-attenuate leaves and the very slender involucral bracts ciliate. Though formerly confused with *A. frondosus, A. laurentianus* has less affinity with that species than with *A. angustus.* In *A. frondosus* the ligule is well developed and the involucre has its outer series of bracts successively shorter than the inner, while in the rayless *A. laurentianus* the outer series are successively longer.

Aster laurentianus belongs to a peculiar little group of annual species (§ *Conyzopsis*) widely dispersed in saline or subsaline habitats and somewhat transitional in their floral structure between true *Aster* and the genus *Conyza.*[1] By some authors the section *Conyzopsis* is kept apart generically (as it once was by Asa Gray) from *Aster* as *Brachyactis,* characterized as a group of annuals with "rays not exceeding the mature pappus or none";[2] but, as long ago pointed out by Asa Gray, the annual *A. subulatus* (generally maintained as an *Aster,* not a *Brachyactis*) "with its inconspicuous rays, hardly surpassing the disk and commonly surpassed by the mature pappus, and with its fewer disk-flowers, must be held to invalidate the genus *Brachyactis.*"[3] The distinctness of *Brachyactis* as a genus is further menaced by the publication of such species as *B. hybrida* Greene, a plant said by its author to be "remarkable as a *Brachyactis* for its many long rays [about 1 cm. long], as well as by its apparently perennial duration; otherwise it is at perfect agreement with other members of this well marked genus."[4]

[1] See Gray, Proc. Am. Acad. xvi. 99 (1880).
[2] Britton in Britton & Brown, Ill. Fl. ed. 2, iii. 348 (1913).
[3] Gray, l. c.
[4] Greene, Leaflets, i. 147 (1905).

Aster subulatus as it occurs on Nepisiguit Bay, isolated by many hundreds of miles of coast-line from the northern limit of continuous occurrence of the species, differs at a glance in its spatulate obtuse leaves; and in some other characters it departs from typical *A. subulatus* of the Atlantic Coast. Its strongly ascending branches bear few comparatively scattered heads; the involucres are more herbaceous, the bracts in some plants subequal; and the ligules more prominent than is common in *A. subulatus* and strongly inclined to be in only 1 row. These characters, if constant, would indicate a clearly marked species, but a close study of the available material shows that they are not absolute. The lower and median cauline leaves are usually fairly constant in their rounded apex but a few individuals from New Brunswick show acute or acuminate tips; the erect branching is exhibited by occasional small plants of otherwise good *A. subulatus;* the herbaceous involucre, though reasonably constant in the New Brunswick collections, is strongly approached by plants from the Boston district, and exceptional individuals of the New Brunswick series have the outer bracts as short as in typical *A. subulatus;* and the ligules, though longer in the New Brunswick plant than in most of the material from the Atlantic coast, are very closely approached in occasional plants from southern New England, where their length and number are variable. It seems to the writer, then, that the plant from Nepisiguit Bay is best treated as

ASTER SUBULATUS Michx., var. **obtusifolius,** n. var., foliis inferioribus mediisque spathulatis apice rotundatis vel obtusis; ramis arcte adscendentibus paucicapitatis; bracteis involucri plerumque subaequalibus exterioribus subherbaceis; ligulis 4–5 mm. longis pappum valde superantibus.

Lower and median leaves spatulate, rounded or obtuse at apex: branches strongly ascending, bearing few heads: involucral bracts mostly subequal, the outer subherbaceous: ligules 4–5 mm. long, obviously exceeding the pappus.—NEW BRUNSWICK: abundant on sandy salt marsh at mouth of Nepisiguit (possibly Middle) River, Bathurst, July 25, 1902, *E. F. Williams & M. L. Fernald;* brackish marsh along Middle River, Bathurst, August 13, 1913, *S. F. Blake,* no. 5372 (TYPE in Gray Herb.).

EXPLANATION OF PLATE 109.

Fig. 1. *Aster laurentianus,* ×1; fig. 2, marginal flower, ×5; fig. 3, corolla of central flower, ×5. Fig. 4. *A. laurentianus,* var. *magdalenensis,* ×1. Fig. 5. *A. laurentianus,* var. *contiguus,* ×1. Fig. 6. *A. subulatus,* var. *obtusifolius,* × 1.

GRAY HERBARIUM.

NOTES ON NEW ENGLAND HEPATICAE,— XI.

Alexander W. Evans.

In the last paper[1] of this series the rare *Neesiella pilosa*, a member of the Marchantiaceae, was reported for the first time from New England. The scanty material which served as the basis for this record was collected in 1898 by F. G. Floyd, at the base of a limestone-bearing cliff on Willoughby Mountain in northern Vermont. During the past summer it was the writer's good fortune to visit this interesting botanical region under the guidance of Miss Annie Lorenz, to whom it had long been familiar. As a result of this visit several species were added to the hepatic flora of Vermont, four of which represent additions to the New England flora as well. Of these four species two, *Clevea hyalina* and *Neesiella rupestris*, belong to the Marchantiaceae. These are especially worthy of note because the total number of Marchantiaceae known from New England is only ten, and because there is little probability that this number will be materially increased. The other additions include *Lophozia grandiretis* and the curious *Diplophyllum gymnostomophilum*, a species which has been shifted about from one genus to another since it was originally described in 1896. The paper discusses also the synonymy of *Lophozia quinquedentata* and *Cephalozia media*, proposes a new name in the genus *Plagiochila*, and is concluded by a list of additions to local state floras and a census of New England Hepaticae according to the information now at hand.

1. Clevea hyalina (Sommerf.) Lindb. Not. Soc. F. et Fl. Fenn. **9**: 291. 1868. *Marchantia hyalina* Sommerf. Mag. Naturw. II. **1**: 284. 1833. *Sauteria hyalina* Lindb. Öfver. Vetensk.-Akad. Förh. **23**: 561. 1866 (in part). *Plagiochasma erythrospermum* Sulliv.; Austin, Proc. Acad. Philadelphia for 1869: 229. *Aitonia erythrosperma* Underw. Bull. Illinois State Lab. Nat. Hist. **2**: 43. 1884. On a limestone-bearing cliff, Willoughby Mountain, Vermont (*Miss Lorenz & A. W. E.*, July, 1913). New to New England. The material grew on sandy detritus, partially overhung by the steep rocks. Most of the stations were shaded and more or less protected from the rain. The carpocephala found were old and weathered, and a trip in May or

[1] Rhodora **14**: 209–225. 1912.

June would probably be necessary to secure them in good condition. *Clevea hyalina* is a species of arctic and alpine regions and is known from many localities in Europe. In North America it has already been collected in Greenland, Ellesmere Land, North Lincoln, Quebec, British Columbia, Montana, Colorado, Idaho, Utah, Washington, and California. The species is fully described by Howe in his Hepaticae and Anthocerotes of California [1] and by K. Müller in his Lebermoose Deutschlands, Oesterreichs und der Schweiz.[2] Numerous interesting details may be found also in Solms-Laubach's account of the "Marchantiaceae Cleveideae und ihre Verbreitung." [3] The plant, however, is so different from the other Marchantiaceae known from New England that a few words about its most striking peculiarities may not be out of place.

The genus *Clevea* belongs to the group Astroporae of Leitgeb,[4] so called because the small epidermal pores are surrounded by cells the radial walls of which are strongly thickened. This peculiarity is well marked in typical forms of *C. hyalina* but not in Howe's variety *californica*, known only from California, or in the rare *C. Rousseliana* (Mont.) Leitgeb, known only from Greece, Italy, Algeria, and the Canary Islands. Other interesting features of the Astroporae are found in the method of dehiscence of the capsule and in the cells of the capsule-wall. The wall splits from the apex to about the middle into several irregular lobes with ragged edges, and no definite lines of dehiscence can be distinguished. The capsule-wall is composed of a single layer of cells, the walls of which show numerous thickenings in the form of rings or half-rings. In these respects the Astroporae agree with most of the complex Compositae (including the genera *Conocephalum*, *Lunularia*, *Marchantia*, and *Preissia*) and differ sharply from the Operculatae (including the genera *Asterella*, *Grimaldia*, *Neesiella*, and *Reboulia*), in which the capsule opens by a more or less distinct circular lid and is composed of cells without annular thickenings. In addition to *Clevea* the Astroporae include the two genera *Sauteria* and *Peltolepis*, both of which have been reported from northern North America. In the structure of the thallus these three genera are very much alike, but good generic characters are afforded by the

[1] Mem. Torrey Club **7**: 36. 1899.
[2] Rabenhorst's Kryptogamen-Flora **6**: 241. 1907.
[3] Bot. Zeitung **57** [1]: 15–37. 1899.
[4] Unters. über Lebermoose **6**: 49. 1881.

inflorescences, both male and female. In *Clevea* and *Sauteria* the antheridia are borne in irregular and poorly defined groups on the upper surface of the thallus and are not surrounded by protective scales. In *Peltolepis* the antheridia are collected in definite disc-like inflorescences surrounded by scales. In *Clevea* the stalk of the carpocephalum arises from the upper surface of the thallus and is quite destitute of longitudinal grooves enclosing rhizoids. In *Sauteria* and *Peltolepis* the stalk arises from the end of a thallus-branch; in *Sauteria* there is one rhizoid-bearing groove present and in *Peltolepis* two. These differential characters indicate that *Clevea* occupies the lowest place in the Astroporae from the standpoint of phylogeny and *Peltolepis* the highest.

The thallus in *Clevea hyalina* is smaller than in most of the New England Marchantiaceae, averaging about 3 mm. in width. The upper surface is typically green, sometimes with a glaucous cast, but the margins in some cases at least are bordered with purple. The boundaries of the air-spaces show clearly under the lens. The ventral scales are large and conspicuous and extend beyond the margin of the thallus. At the apical extremity they form a distinct cluster extending backward over the growing point. The scales are pointed and are either white and hyaline throughout or else more or less tinged with purple. These scales form one of the most characteristic features of the species and are often of great service in the determination of sterile material.

2. Neesiella rupestris (Nees) Schiffn.; Engler & Prantl, Nat. Pflanzenfam. 1^3: 32. *f. 17, G–K* (after Bischoff). 1893. On a limestone-bearing cliff, Willoughby Mountain, Vermont (*Miss Lorenz & A. W. E.*, July, 1913). New to New England but already known, in North America, from Quebec, Ontario, New York, Ohio, and Illinois. Also known from various parts of Europe and from Japan. Since the most important characteristics of the species were described by the writer in the Bryologist for September, 1911, it will not be necessary to repeat them here. The Vermont material is not abundant. It grew in localities similar to those described under *Clevea hyalina*, and the two species were occasionally mixed. Unfortunately the few carpocephala collected were so old and weathered that the united spirals of the elaters, first noted by Schiffner, could not be clearly demonstrated. The specimens lacked, however, the abundant scales

found in *N. pilosa*, so that their reference to *N. rupestris* is probably correct. It is to be regretted that no satisfactory specimens of *N. pilosa* were collected, although the cliff where F. G. Floyd found his material was visited. This was very likely due to the fact that the plants were collected after they had passed their prime, so that it was difficult to distinguish between similar species in the field. It should be borne in mind, however, that *N. pilosa* and *N. rupestris* are very closely related species and that there is some possibility that they may not be distinct. Schiffner has already mentioned this possibility and describes a region in the Tirol where *Necsiella carnica* (Massal.) Schiffn., a species doubtfully distinct from *N. pilosa*, grows in company with plants which cannot be distinguished from *N. rupestris* and also with plants which seem to be intermediate between *N. carnica* and *N. rupestris*.[1] He suggests two explanations: first, that the specimens of apparent *N. rupestris* may actually represent true *N. rupestris*, in which case *N. carnica* and *N. rupestris* would be synonymous; second, that they may simply represent individuals of *N. carnica*, so affected by deep shade and increased water-supply that they resemble *N. rupestris* in all respects. He hesitates to decide the question on the basis of what he found in a single locality but recommends it for the consideration of others who may be fortunate enough to make observations upon these rare plants in the field. If it should ever be established that *N. pilosa*, *N. rupestris*, and *N. carnica* were synonyms, the species would have to bear the name *N. pilosa* on the ground of priority.

3. Lophozia grandiretis (Lindb.) Schiffn. Lotos **51**: [20]. 1903. *Jungermannia grandiretis* Lindb. Medd. Soc. F. et Fl. Fenn. **9**: 158. 1883 (*nomen nudum*); Kaalaas, Nyt Mag. for Naturv. **33**: 322. 1893. On moist exposed earth in a marly swamp, Willoughby, Vermont (*Miss Lorenz & A. W. E.*, July, 1913). Collected also by A. H. Brinkman at Banff, Alberta, in 1912 (No. 606, in part). New to North America. In Europe the species is known from a few scattered localities in Norway, Sweden, Finland, Denmark, Germany, and Switzerland. The material from Vermont is destitute of sexual organs but bears gemmae in abundance. It agrees closely with the specimens distributed by Schiffner (as a new variety *humilis*) in his Hepaticae Europaeae, No. 116. At first glance the species bears some

[1] Hedwigia **47**: 315. 1908.

resemblance to *L. Mildeana* (Gottsche) Schiffn., but the gemmiparous branches and the gemmae themselves would indicate that it was really much more closely related to *L. incisa* (Schrad.) Dumort. Stephani, in fact, goes so far as to include it among the synonyms of *L. incisa*. Interesting observations on *L. grandiretis* have been published by Schiffner,[1] while a full account of the species, with figures, is given by K. Müller.[2]

The stems of *L. grandiretis* are simple or sparingly branched and are more or less pigmented with purple or blackish brown on the lower surface. The leaves are delicate in texture and pale green and are remarkable for being broader than long. In normal cases they are unequally bifid for about one third their length with broadly triangular, bluntly pointed lobes, the margins of which are commonly entire. Toward the apex of the stem trifid leaves are often developed. The leaf-cells are unusually large and are accountable for the specific name of the plant. At the apices of the lobes, according to K. Müller, the cells measure 40–50 μ in diameter, but in the middle of the leaf they attain a length of 60–80 μ and a width of 40–50 μ. The walls are rather thick and small trigones are usually developed. The cuticle is smooth. Underleaves are absent except in the female inflorescence.

The gemmiparous branches bear the gemmae on the tips of crowded leaves, somewhat reduced in size, and the development of the gemmae quickly brings the growth of the branches to an end. The gemmae, which have recently been figured by Warnstorf,[3] measure 25–30 μ in diameter. They are unicellular or bicellular and are sharply angular or even stellate.

Even in the absence of inflorescences *L. grandiretis* may usually be distinguished without much trouble from *L. incisa*. In the latter species the stems are green throughout, the leaves are longer than broad, the lobes of the leaves often bear angular or spine-like teeth, the cells measure only 25 μ in diameter at the apices of the lobes and only 30–40 μ in the middle of the leaf, the cell-walls are thin, and trigones are scarcely to be demonstrated. The gemmiparous branches and the gemmae are much alike in the two species, although the gemmae in *L. incisa* are distinctly smaller, averaging only 15 μ in diameter.

In the opinion of Warnstorf *L. grandiretis* is closely related to *L.*

[1] Oesterr. Bot. Zeitschr. **57**: [5]. 1907.
[2] Rabenhorst's Kryptogamen-Flora **6**: 705. *f. 322.* 1910.
[3] Hedwigia **53**: 209. *f. 4.* 1913.

marchica (Nees) Steph., more closely in fact than to *L. incisa*. In *L. marchica* the stems are deeply pigmented, the leaves are usually broader than long, and the leaf-cells measure 40–50 μ in diameter in the middle of the leaf. But the leaves are much more frequently trifid or even quadrifid, the cell-walls are thin, and there are no trigones. The gemmae, too, are very different. They are unicellular bodies about 16 μ in diameter and are spherical or oval in form with an even surface. In *L. Mildeana*, a close ally of *L. marchica*, a species to which reference has already been made, the stems are usually unpigmented, although the leaves vary in color from pale green to deep purple. Here again the leaves are frequently trifid or quadrifid and the leaf-cells average about 40 μ in diameter in the middle of the leaf, but the walls are sometimes more or less thickened and trigones may sometimes be discerned. The gemmae in *L. Mildeana* are similar to those of *L. marchica*, but the gemmiparous shoots are slender and upright, with minute scattered leaves, and bear a mass of crowded and reduced gemmiparous leaves at the apex.

4. Lophozia quinquedentata (Huds.) Cogn. Bull. Soc. Roy. Bot. de Belgique **10**: 279. 1872. *Jungermannia quinquedentata* Huds. Fl. Angl. Ed. I. 511. 1762. *J. Lyoni* Tayl. Trans. Bot. Soc. Edinburgh **1**: 116. *pl. 7*. 1844. *Lophozia Lyoni* Steph. Bull. de l'Herb. Boissier II. **2**: 157. 1902. *Barbilophozia quinquedentata* Loeske, Verh. Bot. Ver. Prov. Brandenburg **49**: 37. 1907. In the writer's first series of "Notes on New England Hepaticae" [1] the name *Lophozia Lyoni* was used for the present species instead of *L. quinquedentata*, in spite of the fact that *Jungermannia quinquedentata* Huds. was published so much earlier than *J. Lyoni* Tayl. The older name was discarded because there seemed to be some doubt as to which species Hudson's *J. quinquedentata* actually represented. Pearson,[2] for example, without going so far as to include *J. quinquedentata* among the synonyms of *J. barbata* Schmid., quotes a letter from Spruce, saying that the two species are probably identical. Schiffner [3] admits that Hudson's description of *J. quinquedentata* is much too brief to lead to a positive determination. He states, however, that Hudson gave, as a reference to his species, Dillenius, Historia

[1] Rhodora **4**: 210. 1902.
[2] Hep. British Isles 341. 1901.
[3] Lotos **53**: [16]. 1905.

Muscorum, *pl. 71, f. 23,* and that this figure undoubtedly represents *J. quinquedentata* as understood by later authors. He maintains further that this opinion is supported by the specimens in the Dillenian herbarium and quotes Lindberg as his authority for this statement. Unfortunately Lindberg is not quite so definite as Schiffner implies. In the latest of the three works quoted, Kritisk Granskning af Mossorna uti Dillenii Historia Muscorum (Helsingfors, 1883), he says (p. 41) that the figure of Dillenius and the corresponding specimen in his herbarium represent a mixture of *Bazzania trilobata* (L.) B. Gr. and *J. quinquedentata* Huds. According to his account the portion of the figure showing the vegetative leaves is drawn from the *B. trilobata,* while the terminal perianth is drawn from the *J. quinquedentata.* It is to be regretted that the evidence in favor of Hudson's species is not absolutely conclusive. At the same time the fact that the perianths in the Dillenian figures and specimens belong to *J. quinquedentata* as now understood is perhaps sufficient justification for the use of Hudson's specific name. In the writer's "Revised List of New England Hepaticae"[1] the name *Lophozia quinquedentata* is therefore taken up instead of *L. Lyoni,* and this usage prevails in the recent works of K. Müller, Macvicar, and other European hepaticologists.

5. **Plagiochila Austini** nom. nov. *P. spinulosa* Aust. Hep. Bor.-Amer. No. 9. 1874 [not *P. spinulosa* (Dicks.) Dumort.]. *P. Sullivantii* Evans, Bot. Gazette **21**: 191. 1896 (in part). *P. Sullivantii* Steph. Bull. Herb. Boissier II. **3**: 335. 1903. The name *Plagiochila Sullivantii* was originally given by Gottsche to the specimens distributed by Sullivant in his Musc. Alleg. No. 219. These specimens were collected "in sylvaticis montosis Virginiae" and were referred by Sullivant to the European *P. spinulosa* (Dicks.) Dumort. Gottsche included under his *P. Sullivantii* a second specimen from North Carolina, preserved in the Lindenberg herbarium at Vienna. Unfortunately he neglected to publish a description of his new plant; it remained as a manuscript species in his herbarium. When the writer published his "Notes on the North American Species of *Plagiochila,*" in 1896, *P. Sullivantii* was among the species proposed as new. It was understood, however, in a somewhat broader sense than the species of Gottsche and was made to include not only the two plants which he

[1] Rhodora **15**: 25. 1913.

studied but also the material distributed by Austin in his Hep. Bor.-Amer. No. 9, and a series of specimens from New England, New York, and Pennsylvania. At the same time the point was strongly emphasized that Sullivant's specimens were to be considered the type of the species. When Stephani, several years later, monographed the genus *Plagiochila* for his "Species Hepaticarum" he expressed the opinion that *P. Sullivantii*, as described and figured in the "Notes," was an aggregate and included two distinct species, an opinion with which the writer is now disposed to concur. Instead, however, of reserving the name *P. Sullivantii* for the type of the species, he applied it to the plants from New England, Pennsylvania, and North Carolina. For Sullivant's specimens he chose the manuscript name *P. alleghenicnsis* Evans, a name given to these plants by the writer at the beginning of his studies on *Plagiochila* but discarded in favor of Gottsche's name when the results of these studies were published. Stephani's course does not seem warranted because it excludes from Gottsche's species the very specimen that was definitely cited as the type at the time the species was published. It therefore seems necessary to restrict the name *P. Sullivantii* so that it may include this type specimen and to give the species segregated from *P. Sullivantii* a new name as indicated above. Austin's specimens distributed in Hep. Bor.-Amer. No. 9, may then be regarded as the type of *P. Austini*. They were collected on "shaded steep rocks in mountainous regions," and probably came either from the White Mountains or from New York. The following more definite stations for the species may likewise be quoted: White Mountains, New Hampshire (*T. P. James*); Naugatuck, Branford, and Redding, Connecticut (*A. W. E.*) [1]; Slide Mountain, Ulster County, New York (*E. G. Britton*); Adirondack Reserve, New York (*E. G. Britton*); Canadensis, Pennsylvania (*E. G. Britton*); Quarry Run, West Virginia (*A. LeRoy Andrews*). The specimens from North Carolina must remain doubtful for the present. Of the figures published by the writer in connection with *P. Sullivantii*, the following represent *P. Austini*: *pl. 15, f. 18, 20, 21; pl. 16, f. 1–3.*

The narrowly ovate leaves in *P. Austini* will distinguish it from the true *P. Sullivantii*, where the leaves are distinctly obovate. The leaves are sharply spinose-dentate, the number of teeth being usually from two to six. In many cases two teeth at the apex of a leaf are

[1] Specimens from Naugatuck, incorrectly labeled "Beacon Falls" were distributed in Underwood & Cook's Hep. Amer. No. 111, under the name *P. spinulosa.*

larger than the others and give the leaf a bifid appearance. This is especially striking on shoots with poorly developed leaves, and many of the specimens produce a great many branches of this character, perhaps on account of the deep shade in which they grow. The perichaetial bracts and perianths of the species, as well as the androecia, are still unknown. There seems to be likewise no development of the slender flagilliform branches which grow out of the leaf-cells in many species of *Plagiochila* and act as organs of vegetative reproduction. The stems and branches, however, are extremely fragile, and the leaves readily become detached, especially when dry. Through their regeneration they probably play an important part in the dissemination of the species.

6. Cephalozia media Lindb. Medd. Soc. F. et Fl. Fenn. **6**: 242. 1881. *Jungermannia lunulaefolia* Dumort. Syll. Jung. Eur. 61. 1831? *Cephalozia lunulaefolia* Dumort. Recueil d'Obs. sur les Jung. 18. 1835? *Jungermannia connivens*, forma *symbolica* Gottsche; G. &. R. Hep. Europ. No. 624. 1877 (note under *J. lacinulata* Jack). *Cephalozia catenulata*, var. *pallida* Spruce, On Cephalozia 33. 1882. *C. multiflora* Spruce, *l. c.* 37. 1882. *C. symbolica* Breidl. Mitt. Naturw. Ver. Steiermark **30**: 330. 1894. *C. pallida* Spruce; Pearson, Hep. British Isles 146. *pl. 55*. 1900. *C. symbolica*, var. *pallida* Massal. Malpighia **21**: [18]. 1907. The synonymy of this common and widely distributed species has long been in confusion, and even at the present time writers disagree about the name which it ought to bear. The confusion is largely owing to the fact that the older writers failed to distinguish between *C. media* and *C. connivens* (Dicks.) Lindb. Gottsche was apparently the first to recognize the distinctive characters of the two plants, although he continued to regard them as forms of a single variable species. In 1881 Lindberg described his *C. media* and brought out its most striking differential features, but for some reason his species remained unrecognized for a long time outside of Scandinavia.

In 1882 Spruce published his *C. multiflora* as a new species, apparently in ignorance of the *C. media* of Lindberg, which he does not quote at all. Fortunately Spruce's name is antedated by Lindberg's, otherwise it might have caused a good deal of trouble on account of its being a homonym of *C. multiflora* Lindb.[1], published several years

[1] Acta Soc. Sci. Fenn. **10**: 501. 1875. See Howe (Bull. Torrey Club **29**: 281. 1902.) for a discussion of *C. multiflora* Lindb. and of Lindberg's views on *Jungermannia multiflora* Huds., upon which it was presumably based.

earlier. The next name to be taken up was the *C. symbolica* of Breidler, published in 1894. This name is still used by a number of continental writers but is invalid according to the International Rules of Botanical Nomenclature, adopted in Vienna in 1905, in spite of the fact that the name *symbolica* was published four years earlier than the name *media*. The rule which applies to the present case is embodied in Article 49 and reads, "when . . a subdivision of a species becomes a species . . the earliest name received . . in its new position must be regarded as valid." Since *Cephalozia media* was the name first applied to *Jungermannia connivens*, forma *symbolica*, when it was raised to specific rank, it is clear that the name *C. media* ought not to be supplanted by *C. symbolica*.

The name *C. lunulaefolia* of Dumortier was revived for the present species by Pearson on the authority of a letter received from Spruce, and has been adopted to a considerable extent by American writers. In Spruce's letter he comments upon the difficulty of securing authentic specimens of Dumortier's species. He states, however, that he was able to obtain, from the herbarium of the botanical garden at Brussels, specimens quoted by Dumortier in his original publication of *Jungermannia lunulaefolia* and, long afterwards, in connection with his description of *Cephalozia lunulaefolia*.[1] These specimens were distributed by Mougeot, Nestler and Schimper, under the name *J. connivens*, in their Stirpes Kryptogamae Vogeso-Rhenanae, No. 434, and were referred by Spruce without question to his *C. multiflora*. But, according to K. Müller,[2] the specimens distributed under No. 434 represent *C. serriflora* Lindb. instead of *C. media*, and the description of Dumortier certainly applies better to *C. serriflora* than to the other species. In any case *C. lunulaefolia* seems to have been based on a mixture of species and it seems wisest to discard it altogether as K. Müller, Macvicar, and other recent writers have done. With regard to the status of *C. pallida*, first published as a species by Pearson, the views of writers vary, but there seems to be a strong tendency to regard it as a variety of *C. media*.

7. Diplophyllum gymnostomophilum Kaalaas, Vidensk-Skrift. I. 1898[9]: 4–9. *f. 1–4. Scapania gymnostomophila* Kaalaas, Bot. Not. 1896: 21. *Martinellia gymnostomophila* Arnell & C. Jensen, Bih.

[1] Hep. Europ. 93. 1875.
[2] Mém. de l'Herb. Boissier 6: 7. 1900.

Kongl. Svenska Vetensk. Akad. Handl. **21**[10]: 28. *pl.* –, *f. B.* 1896. *Diplophylleia gymnostomophila* K. Müll. Nova Acta Acad. Caes. Leop. Carol. **83**: 305. 1905. *Sphenolobus gymnostomophilus* Schiffn. Oesterr. Bot. Zeitschr. **58**: [3] 1908. On a limestone-bearing cliff, mixed with other bryophytes, Willoughby, Vermont (*Miss Lorenz*, July 1913). New to North America. In Europe the species is now known from Norway, Sweden, King Oscar Land, Scotland, and France (Basses-Pyrenées). It seems to be confined to calcareous regions and is everywhere rare. The Vermont plants, which bear gemmae but no sexual organs, agree closely with a Norwegian specimen collected by Kaalaàs himself and kindly communicated by Miss Lorenz.

The original material of this interesting species was collected by Kaalaas in the vicinity of Christiania, although he cites specimens from other stations in Norway as well. It was entirely without archegonia but showed both androecia and gemmae. On account of the lack of perianths Kaalaas could not be sure about the generic position of his plant. He placed it in *Scapania*, at the same time expressing the opinion that it represented a transition between *Scapania* and *Diplophyllum*. A short time afterwards he discovered female plants with perianths. The latter were terete or only slightly flattened and showed numerous folds in the upper part and a contracted mouth. These peculiarities were naturally considered sufficient to exclude the species from *Scapania*, and it was therefore transferred to *Diplophyllum*. In this position it remained unchallenged until Schiffner pointed out the fact that it showed a relationship to *Jungermannia Helleriana* Nees and especially to *J. ovata* Dicks., two species which have caused considerable discussion among hepaticologists. At the present time *J. Helleriana* is regarded by most students as a species of *Sphenolobus* and is known as *S. Hellerianus* (Nees) Steph. With respect to *J. ovata*, however, opinions are still at variance. Some writers, including Schiffner, consider it a *Sphenolobus* and call it *S. ovatus* (Dicks.) Schiffn.; others include it among the species of *Diplophyllum*. Since Schiffner considers *J. ovata* a species of *Sphenolobus*, he naturally transferred *D. gymnostomophilum* to the same genus.

The genus *Diplophyllum* is exceedingly artificial and at the same time forms a connecting link between the genera *Scapania* and *Sphenolobus* and therefore between the subdivisions Epigoniantheae and Scapanioideae, which are usually placed rather far apart in arrange-

ments of the Hepaticae. In common with *Scapania* it has complicate, bilobed leaves with a sharp keel and unequal, variously spreading lobes; in common with *Sphenolobus* it has a more or less cylindrical perianth, contracted at the mouth and plicate in the upper part. Warnstorf [1] includes *Sphenolobus* under *Diplophyllum*. Stephani [2] excludes *Sphenolobus* but includes K. Müller's group *Plicaticalyx* [3] of *Scapania*. Warnstorf, therefore, emphasizes its relationship to the Epigoinantheae while Stephani emphasizes its relationship to the Scapanioideae. Typical members of the genus, such as *D. albicans* (L.) Dumort., are distinct enough from both *Spenolobus* and *Scapania*, if these genera are defined according to their characteristic representatives. But in *J. ovata* there is a clear link between *Diplophyllum* and *Sphenolobus*, and in *Jungermannia ferruginea* Lehm. (*Scapania ferruginea* Lehm. & Lindenb.), of India, there is an equally clear link between *Diplophyllum* and *Scapania*. Under the circumstances three courses are possible. The genus *Diplophyllum* might be given up altogether and its species divided up among *Sphenolobus* and *Scapania*. It might be reserved for its typical species, all doubtful forms being referred to *Sphenolobus* or *Scapania*. It might be more broadly understood and made to include both typical and doubtful forms, the artificial nature of the genus being fully recognized. Perhaps the last course would attract the most adherents. If this is followed, and to the writer it seems as good a course as any, both *Diplophyllum gymnostomophilum* and *Jungermannia ovata* might well be included under *Diplophyllum*.

With regard to the name of the genus Trevisan [4] substituted *Diplophylleia* for the older *Diplophyllum* of Dumortier [5] because the name *Diplophyllum* had been previously applied by Lehmann [6] to a genus of Scrophulariaceae. *Diplophyllum* Dumort. was therefore a homonym of *Diplophyllum* Lehm. Lehmann's genus, however, was never accepted by many botanists, being regarded as synonymous with the genus *Veronica* L., so that most of the older writers would have regarded Dumortier's use of the name *Diplophyllum*, in a sense entirely different from that of Lehmann, as quite justifiable. Un-

[1] Kryptogamenfl. der Mark Brandenburg **1**: 156–162. 1902.
[2] Sp. Hepat. **4**: 111–116. 1910.
[3] Bull. de l'Herb. Boissier II. **3**: 36. 1903.
[4] Mem. 1st. Lomb. III. **4**: 420. 1877.
[5] Recueil d'Obs. sur les Jung. 15. 1835.
[6] Berl. Mag. **8**[4]: 2. 1814.

fortunately the International Rules of Botanical Nomenclature make no definite provisions for cases of this kind, although they advise that the use of homonyms be avoided in the future (see Recommendation V, b., on page 39). Among the amendments proposed by certain American nomenclature committees in 1909, there was one which provided for the absolute rejection of all generic names which were homonyms.[1] It was hoped that this amendment would be voted upon at the International Congress which met at Brussels in 1910, but unfortunately no such action was taken. The question of homonyms, therefore, remains unchanged, and there is no international rule of nomenclature which would prevent the use of the name *Diplophyllum* of Dumortier. In addition to *Diplophyllum gymnostomophilum*, the New England flora contains the following members of the genus: *D. albicans* (L.) Dumort., *D. apiculatum* (Evans) Steph.,[2] and *D. taxifolium* (Wahl.) Dumort. These three species are given under *Diplophylleia* in the writer's "Revised List of New England Hepaticae." [3]

Since *D. gymnostomophilium* is fully described and figured by Kaalaas and, more recently, by Nicholson,[4] only a few of its more important peculiarities will be discussed in the present paper. The plants are more or less tinged with yellowish brown and usually grow mixed with mosses. The stems are about 2 cm. long and are rarely branched. The ventral lobes of the leaves spread widely from the stem, often at more than a right angle and attain a size of about 1×0.6 mm. when well developed. They are oblong in form and more or less falcate, the curved lateral margins tending to be parallel. The apex is normally rounded, although the production of gemmae sometimes makes it more or less pointed. The dorsal lobes spread obliquely, at an angle of forty-five to sixty degrees; they are ovate in form and measure about 0.6×0.35 mm. The apex is commonly pointed and is sometimes apiculate. The margins of both lobes are entire throughout, and the sharp keel connecting them is usually distinctly incurved. In the ventral lobe the marginal cells measure about 14 μ in diameter, while the median cells measure about 22×16 μ. The latter tend to be arranged in longitudinal rows, but this arrangement is not always

[1] See Bull. Torrey Club **36**: 61. 1909.
[2] Sp. Hepat. **4**: 110. 1910.
[3] Rhodora **15**: 23. 1913.
[4] Jour. Bot. **51**: 158, *pl. 526, f. 1–6*. 1913.

apparent, and a false nerve is never differentiated as in *D. albicans*. The walls of the leaf-cells are slightly thickened, the trigones are small and often indistinct, and the cuticle is smooth or indistinctly roughened. The gemmae, which seem to be invariably present, are usually bicellular and vary in outline from oval to rhombic; they have thickened yellow walls and average about 28 × 14 μ when well developed. The inflorescence is dioicous, the male and female plants growing separate.

A very close ally of *D. gymnostomophilum* is the arctic *D. incurvum* Bryhn and Kaalaas,[1] known from North Lincoln, Ellesmere Land, and King Oscar Land. This species is of about the same size but is more deeply pigmented so that it often appears brown. The leaves are relatively broader, the ventral lobe being broader than long, and the dorsal lobe is usually obtuse. In the common *D. apiculatum* of the eastern United States, the inflorescence is autoicous, and both ventral and dorsal lobes are pointed. It is further distinguished by the fact that the margins of the lobes are often denticulate or, in the apical portion, even dentate, although entire lobes also occur. The cells are a trifle smaller, averaging about 18 × 12 μ in the middle of the ventral lobe.

Small sterile forms of *Scapania curta* (Mart.) Dumort. also resemble *D. gymnostomophilum* in certain respects. Usually, however, the margins of the lobes are more or less toothed, and the leaf-cells are a little larger, the marginal cells averaging about 17μ in diameter, and the median cells about 22 μ. The latter, moreover, tend to be more isodiametric and show no indications of an arrangement in longitudinal rows. The trigones in *S. curta* are often conspicuous and the gemmae, although bicellular, average only about 20×9 μ, being thus considerably smaller than in the *Diplophyllum*.

The additions to local state floras, not already mentioned in the preceding pages, are as follows: —

For Maine. *Metzgeria pubescens, Cephaloziella Sullivantii, Chiloscyphus rivularis, Jungermannia cordifolia,* and *Lophozia Kaurini;* Round Mountain Lake and vicinity, Franklin County (*Miss Lorenz*).

For New Hampshire. *Calypogeia Sullivantii;* Passaconaway (*Miss Elizabeth Welsh*). *Cephalozia Francisci* and *Lophozia confertifolia;* Waterville (*Miss Lorenz*).

[1] Bryhn, Rep. Second Norwegian Arctic Exped. in the "Fram" 11: 48. 1906.

For Vermont. *Pallavicinia Flotowiana, Calypogeia suecica, Cephaloziella byssacea,* and *Frullania Selwyniana;* Willoughby (*Miss Lorenz & A. W. E.*). Through an unfortunate oversight *Riccardia multifida* and *R. palmata* were not credited to Vermont in the writer's "Revised List"; both should have been marked with the sign "+."

For Massachusetts. *Jungermannia pumila;* Oxford (*Miss Greenwood*), included in the "Revised List."

For Connecticut. *Nardia Geoscyphus;* Bolton (*Miss Lorenz*).

The census of New England Hepaticae now stands as follows: Total number of species recorded, 181; number recorded from Maine, 128; from New Hampshire, 133; from Vermont, 117; from Massachusetts, 97, from Rhode Island, 77; from Connecticut, 135; common to all six states, 54.

Sheffield Scientific School, Yale University.

Viola emarginata in Massachusetts.— In his treatment of the violets in the seventh edition of Gray's Manual Doctor Brainerd gives the known range of *Viola emarginata* Le Conte as extending no further north than New Jersey. Some years earlier this violet had been attributed to New York on the strength of certain specimens from Staten Island that were then accepted as this species. But that was at a time of transition in our knowledge of violets when scarcely anyone was thinking of hybrid forms, Doctor Brainerd alone being in advance of the time, and these Staten Island specimens that looked like *Viola emarginata* turned out to be in reality crosses, some of them mixtures of *Viola Brittoniana* and *Viola sagittata,* and others hybrids of *Viola fimbriatula.* Subsequently, in 1910, the species was definitely added to the flora of New York, now actually from Staten Island, by Doctor Dowell, who collected it there first in 1907 (Bull. Torr. Club. **37**: 166).

It is rather singular that this violet has never been reported from Long Island, for it is common there, not only on the coastal plain but also in the hilly country north of the terminal moraine. So well distributed is it in southwestern Long Island, for a violet not to be classed among the most common kinds, that I have long believed it would yet be heard from in New England. It may now be recorded from Massachusetts, where it grows on Marthas Vineyard, attaining a very perfect foliar development but, apparently, not fruiting very

freely. I found it there September 23, 1913, well scattered along the thickety slope of a little valley among the hills in Tisbury south of Tashmoo Pond. Excellent specimens were collected, some of which have been sent to the herbarium of the New England Botanical Club.— Eugene P. Bicknell, New York City.

Concerning Philadelphus platyphyllus Rydb.— In the North American Flora, in his monograph of the Hydrangeaceae, Rydberg recognizes several segregates of *Philadelphus Lewisii* Pursh, some of which I identify with that species as synonyms. Among those which I examined was *P. platyphyllus* Rydb. from California. This seems to constitute a rather marked variety, distinguished by its broadly ovate to oval, sometimes nearly rotund leaves. The leaves of the type are exceedingly variable in size and shape, but rarely as broad as in the variety, and never subrotund, generally much smaller. (Extremes: Length 2.4–8.6 cm., breadth 1.3–5 cm.) The leaves of the variety are pretty uniform, mature ones varying from 4–7.5 cm. in length by 2.6–5 cm. in breadth. They are of a pale cast beneath, the outside pair of the five primary veins most often appearing faint. In the type the leaves are greener beneath, with 3 (in broad leaves 5) primary veins.

Philadelphus Lewisii Pursh var. **platyphyllus** (Rydb.) A. H. Moore, n. comb.

P. platyphyllus Rydb. N. Am. Fl. xxii, 167 (Dec. 18, 1905).— Albert Hanford Moore, Washington, D. C.

Orontium at Hyannis, Massachusetts.— Mr. John Murdoch, Jr., in Rhodora, XVI, 18, mentions the occurrence of *Orontium aquaticum* in Middleboro, Truro and Provincetown. I am glad to record its occurrence at Hyannis, where I first found it in August, 1905, and have observed it several times since. This station lies in a wet dune-hollow or small kettle-hole, very near the road which leads southeast from the village to the shore cottages. When I first found it there were only a few bent-over spadices with ripened fruit, but in June, 1909, I was fortunate enough to see the plant in full bloom. I have never seen *Orontium* growing elsewhere, and there are not over 25 plants at this station.— Clarence H. Knowlton, Hingham, Massachusetts.

Two Species New to Cape Cod.— Aira caryophyllea L. In a sandy field, Wellfeet, Massachusetts, Oct. 1, 1913. Nantucket has been the only station for this species in this state, from which its range extends for a long-distance west and south.

Lactuca floridana (L.) Gaertn. Eastham, Sept. 29. 1913, Rather common in sandy soil near the bay shore in the northern part of the town. It is a tall, rather striking plant, with stout, straight stem, and with foliage showing more or less of a reddish shade. Long Island, New York has been the farthest point east and north hitherto recorded.

I am indebted to Prof. M. L. Fernald for determinations of these species; specimens have been deposited in the herbarium of the New England Botanical Club.— Frank S. Collins, North Eastham, Massachusetts.

The Nineteenth Annual Winter Meeting of the Vermont Botanical Club.— The nineteenth annual winter meeting of the Vermont Botanical Club was held in conjunction with the Vermont Bird Club at Burlington, January 30 and 31, 1914. The sessions were held in the Williams Science Hall, University of Vermont.

Eleven botanical papers were read and discussed, Dr. G. P. Burns of the University of Vermont presented a plan for doing ecological work on restricted areas, Mr. J. G. Underwood of Hartland gave a report of the activities of the local nature clubs of the state during the current year, and Dr. H. F. Perkins of the University of Vermont discussed the relation of nature clubs to the schools.

Other papers of interest were "Medicinal Plants" by Mrs. Evaline D. Morgan, of Woodstock, "A Nature Student in Labrador" by Miss Edith M. Estabrook of Boston, Mass. and "Notes on Some Orchids of Fairlee" by Dr. H. M. Denslow of New York, N. Y. Of special interest to the club was the story of the finding of the first station in western Vermont for the male fern, *Aspidium Filix-mas*, by G. L. Kirk of Rutland.

A fine supper complimentary to the visiting members was served at Grassmount Friday night, and in the evening a public lecture was given by Dr. Ezra Brainerd of Middlebury, on "The Blackberries of Vermont." Dr. Brainerd told of his conclusions reached after fourteen years study of the blackberry question and they were certainly interesting.

The summer meeting of 1914 is to be held at West Haven, with headquarters at Fairhaven, during the second week of July.

The officers elected are Pres. Ezra Brainerd, Middlebury; Vice-pres. W. W. Eggleston, U. S. Dep't. Agric. Washington, D. C.; Sec. Dr. George P. Burns, Burlington; Treas., Mrs. Nellie F. Flynn, Burlington; Editor of the Bulletin, George L. Kirk, Rutland; Librarian, Miss Phoebe M. Towle, Burlington.— NELLIE F. FLYNN.

THE FUNGI WHICH CAUSE PLANT-DISEASE. BY F. L. STEVENS.[1]— This volume of about 750 pages with 449 text figures is a companion to the author's "Diseases of Economic Plants" and "is intended to introduce to the student the more important cryptogamic parasites affecting economic plants in the United States, with sufficient keys and descriptions to enable their identification." The treatment includes the Mycetozoa and Bacteria, which occupy fifty pages, the rest of the book being devoted to the Eumycetes.

Professor Stevens has attempted the somewhat difficult task of combining in small compass a text book, a synopsis of the more important genera and families of the fungi, and a manual of plant diseases. General matters of reproduction and structure and even of cytology are taken up in connection with each main group. Keys are given to the genera, families, orders etc., and a very large number of forms are mentioned by name at least; while those of greater economic importance are in general fully treated, usually with figures and citations of literature. It has no doubt been a very difficult matter to decide which forms should receive full consideration and which should be passed over with scant mention or omitted entirely from an enumeration which aims to be so comprehensive as the present, and no two persons would probably agree in making such a selection. It is thus not always evident what has determined the choice of forms to be treated at length; as for example in the case of Echinodothis, which is given nearly a page, while various other forms of equal or much greater economic importance, receive scant reference or are omitted. The figures which are taken from various sources are sufficient and usually good. Mycologists will not, however, recognize *Clitocybe parasitica* in fig. 327. There is no separate host-index and no indication of the diseases referred to under host-names in the general index. Such an arrangement does not seem to be a very convenient one for a book to be used for ready reference. Under 'Oak' for example forty pages are cited by number, and again others under 'Quercus' some of which are not included under 'Oak.' The

[1] The Macmillan Co., New York, 1913. $4.00.

use of common names, only, for hosts is often confusing or inexact, as is usually the case in such a connection. The several lists of literature, cited in the text by consecutive numbers and following the main groups, appear to be full; but do not, as a rule, indicate the nature of the subject treated. The reviewer has not taken pains to verify any of the citations, and it is to be hoped that they have been carefully gone over; but the proof reading of the text has evidently been hastily done. In a cursory examination of the latter, several quite contradictory statements have been noticed, even in single sentences, and there are numerous errata, for the most part misspelled words. Although it is a question how usable this book will prove to persons who have not access to much fuller literature, it will assuredly be of great use to working phytopathologists as a convenient compendium of generally well selected matter relating to the economically more important fungi producing plant-diseases.— R. T.

Vol. 16, no. 183, including pages 45 to 56, was issued 23 March, 1914.

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